

## Chapter Outline

1. Firm Characteristics
2. Market Demand and the Demand Curve for the Perfectly Competitive Firm
3. Production Decisions and the Perfectly Competitive Firm
4. To produce or not to produce: The short-run and the perfectly competitive firm
5. The supply curve of the perfectly competitive firm
6. Market adjustment and the perfectly competitive firm

## Lecture Notes

In this chapter, we will focus on the perfectly competitive firm as the first of the four general firm types that we will examine in this course. We start with the perfectly competitive firm as many of the rules that we derive for this firm type apply to other types of firms and we can find many examples of competitive firms in reality.

### 1. Firm Characteristics

As an introduction, we can briefly review the characteristics of each of the firm types that we will be examining in this course. As illustrated below, the primary characteristics of the perfectly competitive firm are:

1. Numerous buyers and sellers such that no buyer or seller may influence market demand, market supply, or equilibrium price.
2. The firms produce a homogeneous product, that is, there is no substantial differentiation in the product among firms.
3. Firms are price takers, that is, each firm is relatively small with respect to the overall market, and thus they take as given the market price.
4. There are no barriers to entry or exit in the perfectly competitive market, so firms may enter, as they will when economic profits are being made and depart when losses are occurring.

*The assumption of no barriers to entry means that no long-run economic profits can occur in the perfectly competitive industry.*

<b>Perfect Competition</b>	<b>Monopoly</b>	<b>Monopolistic Competition</b>	<b>Oligopoly</b>
Numerous Small Firms	One Firm	Numerous Firms	Several relatively large firms
Homogenous Products	Heterogeneous Products	Heterogeneous Products	Heterogeneous Products
Perfect or Close to Perfect Substitutes	No Close Substitutes	Close Substitutes	Substitutes Exist
No firm has market power or price control	The firm has market power and price control	Firms have minimal market power and price control	Firms are dependent upon each other to exert pricing power and market control
No barriers to entry – No LR Economic Profit	Substantial barriers to entry – Potential LR Economic Profit	Minimal barriers to entry – No LR Economic Profit	Substantial barriers to entry – Potential LR Economic Profit

## 2. Market Demand and Firm Demand Curves

Given that there are numerous small firms in the perfectly competitive market, this means that each firm is a **price taker**, that is, they can sell whatever quantity they wish at the prevailing market price, but they have no ability to influence market price or quantity.

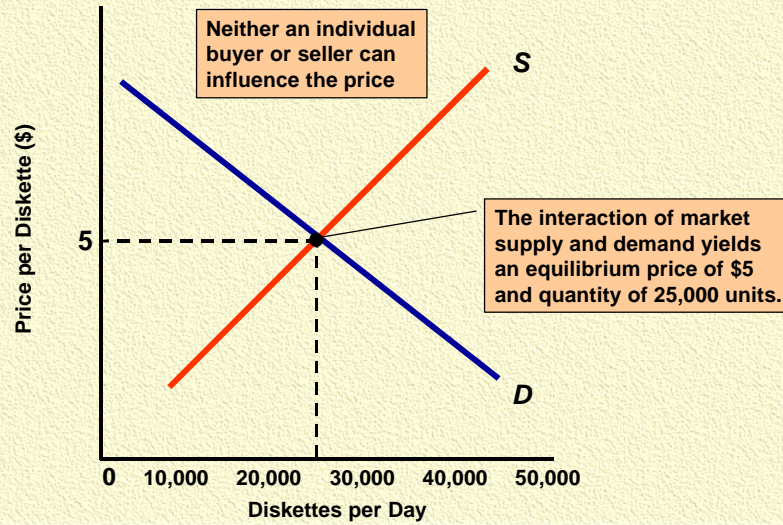
This means that, for example, a firm may find that it can sell its entire production run for a price of \$5.00, but that if it tries to increase price to \$5.01, the quantity demanded for its product declines to zero. Conversely, the firm has no incentive to lower price since it would merely decrease its short-term profitability (or increase its short-term losses).

Why no incentive? Recall that each firm is small relative to the overall market, so at the prevailing market price (\$5.00), the firm can sell all of its output. If the firm lowers its price, it still sells all its output but the revenue from its sales decline relative to selling at \$5.00. Given that firms are profit maximizers, no firm would engage in such behavior in the perfectly competitive market.

This means we can look at the perfectly competitive market from two perspectives, from the overall market perspective and from the firm-level perspective. Since the firm is a price taker, it considers market price as exogenous, that is, determined outside of its purview and something that it cannot change.

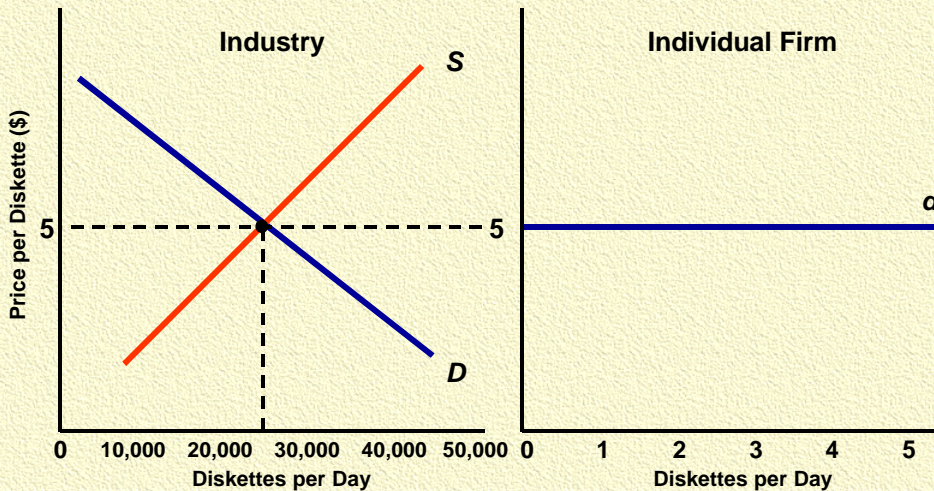
The first graph illustrates the market for computer disks, with market supply and demand interacting such that the daily equilibrium price and quantity are \$5 and 25,000, respectively.

## The Demand Curve for a Diskette Producer



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## The Demand Curve for a Diskette Producer



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As illustrated above, each firm faces a perfectly horizontal or elastic demand curve, such that it may sell whatever quantity it wishes at the prevailing market price but no more than the quantity at a lower price and no quantity at a higher price than what is set in the market.

### 3. Production Decisions and the Perfectly Competitive Firm

The production decisions of the perfectly competitive firm are grounded in the principle of **profit maximization**.

Profit maximization implies that a firm will produce at the point where either profits are maximized in the short-run or losses are minimized in the short-run. To determine what a firm will do in the short-run, we must have information on the fixed and variable cost structure of the firm.

#### *Profit Maximization*

We should note that a firm maximizes **economic profits** and not accounting profits as we have illustrated previously that accounting profits do not account for implicit costs.

An emerging trend in industry today is to use a methodology called **Economic Value Added** (EVA). EVA analysis attempts to capture implicit costs in the analysis of the finances of the firm, that is, EVA gauges the alternatives of investment decisions and determines whether or not the firm was best served by the decisions they made.

We can express profit maximization (or loss minimization) as:

$$\text{Economic profit} = \text{Total Revenue} - \text{Total Costs}$$

$$\text{Economic profit} = (P * Q) - \text{Explicit Costs} - \text{Implicit Costs}$$

#### *Marginal Costs and Marginal Revenue*

To continue our analysis, recall that in economics we have previously stated that the marginal unit is the key unit with respect to decision making. In the profit maximization process, this holds true in that we are primarily interested in the relationship between **marginal costs and marginal revenue**.

In the perfectly competitive model, the firm may sell as many units as they want at the market price, so in essence, the marginal revenue for each unit is equal to the market price, or:

$$P = MR$$

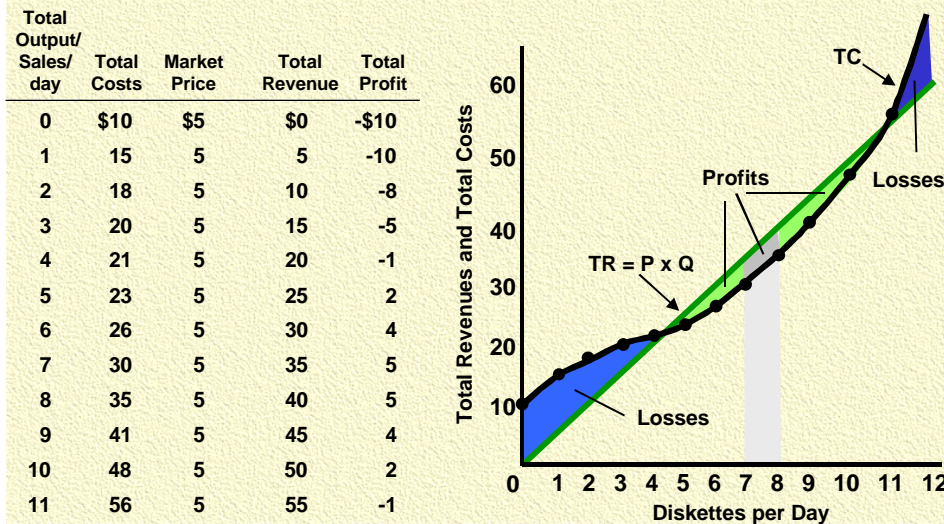


## Profit Maximization

Total Output/ Sales/ day	Total Costs	Market Price	Total Revenue	Total Profit	Average Total Cost	Average Variable Cost	Marginal Cost	Marginal Revenue
0	\$10	\$5	\$0	-\$10	---	---		
1	15	5	5	-10	\$15.00	\$5.00	\$5	\$5
2	18	5	10	-8	9.00	4.00	3	5
3	20	5	15	-5	6.67	3.33	2	5
4	21	5	20	-1	5.25	2.75	1	5
5	23	5	25	2	4.60	2.60	2	5
6	26	5	30	4	4.33	2.67	3	5
7	30	5	35	5	4.28	2.86	4	5
8	35	5	40	5	4.38	3.12	5	5
9	41	5	45	4	4.56	3.44	6	5
10	48	5	50	2	4.80	3.80	7	5
11	56	5	55	-1	5.09	4.18	8	5

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## Profit Maximization



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As illustrated above, **marginal costs** are equal to the change in total costs divided by the change in output, which is also equivalent to the change in total variable costs divided by the change in output.

The decision making process of the firm is quite simple. The firm wishes to produce to that point where profit is maximized or losses are minimized. How does this occur?

In terms of marginal analysis, the firm continues to increase output as long as **MR > MC**, that is, as long as the firm is making a marginal profit on each successive unit of unit, it will continue to expand production. In this range, as output increases, profits increase (or losses decline).

Secondly, the firm will reduce output in the range where **MC > MR**, that is, when the marginal cost of the last unit sold is greater than the revenue generated by that unit, the firm will reduce production. In this range, as output increases, losses increase (or profits decline).

So, for the perfectly competitive firm, it will increase production as long as **MR > MC** and decrease production as long as **MC > MR**, thus production will stabilize when **MR = MC**, that is, when the revenue generated by the last unit of production is equal to the costs of producing that last unit of production.

Given that we have already determined that  $P = MR$ , this means that for the perfectly competitive firm, they will produce at:

$$P = MR = MC$$

#### 4. To Produce or not to Produce

Now that we have determined the decision process for the perfectly competitive firm, we need to examine the four short-run cases that describe the production decision and the financial situation of the perfectly competitive firm. These four cases are:

- A. Short-Run Profit Maximization
- B. Short-Run Break Even (Revenue = Costs)
- C. Short-Run Loss Minimization
- D. Short-Run Shutdown

##### A. Short-Run Profit Maximization

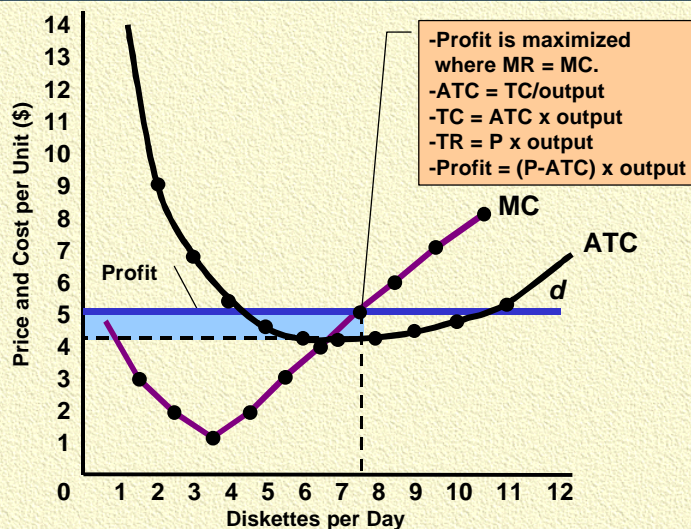
In the short-run, perfectly competitive firms can make economic profits. Recall, these profits decline to zero in the long-run as firms enter the industry.

As illustrated below, the perfectly competitive firm maximizes profits by producing at the point where  $MR = MC$ . Total profit is determined by subtracting Total Costs ( $ATC \cdot Q$ ) from Total Revenues ( $P \cdot Q$ ), or:

$$\text{Profits} = P \cdot Q - ATC \cdot Q = Q \cdot (P - ATC)$$

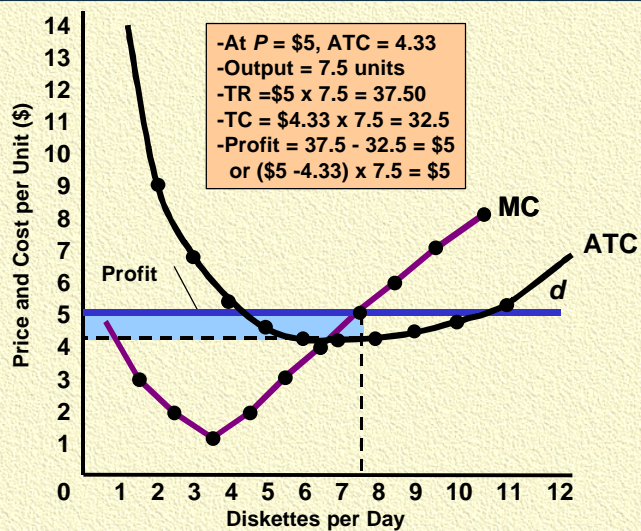


## Short-Run Profits



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## Short-Run Profits



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Note, as previously discussed in Chapter 22, the MC curve intersects the ATC curve at its minimum point. Also note that while  $MC < ATC$ , ATC is declining and when  $MC > ATC$ , ATC is increasing.

## B. Short-Run Break Even (Long-Run Equilibrium)

The next case is when the firm does not make an economic profit or incur an economic loss in the short-run. This also corresponds to the long-run equilibrium for the perfectly competitive industry in that as previously discussed, in the long-run, perfectly competitive firms do not make economic profits due to the ease of entry and exit in the industry.

Where does the break-even occur? Break-even is simply the point where total revenues equals total costs and marginal revenues = marginal costs.

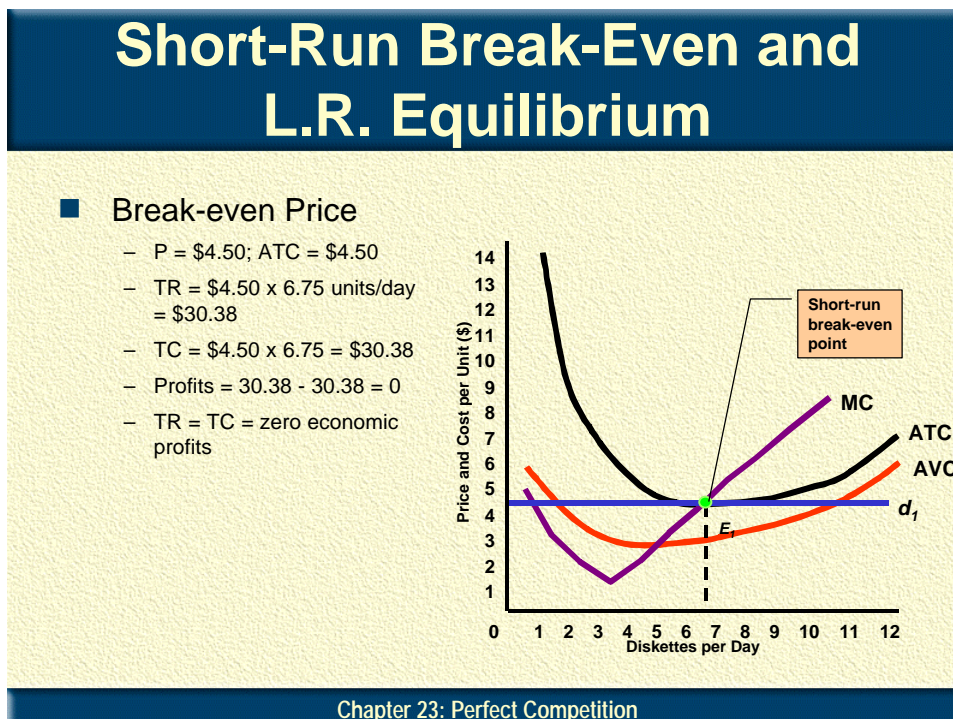
$$\begin{aligned} \text{Break-even: } \text{Total Revenue} &= \text{Total Cost} & : & & P * Q &= \text{ATC} * Q \\ \text{Marginal Revenue} &= \text{Marginal Costs} & : & & P &= \text{MR} = \text{MC} \end{aligned}$$

$$\text{MC} = \text{MR} = P = P * Q = \text{ATC} * Q$$

So, note that for break-even to occur, MC must equal MR which is equal to P which must be equal to ATC, or **MC = ATC**. As previously discussed, the only point where MC is equal to ATC is when ATC is at its minimum, hence **MC = min ATC**. So, the break-even condition is:

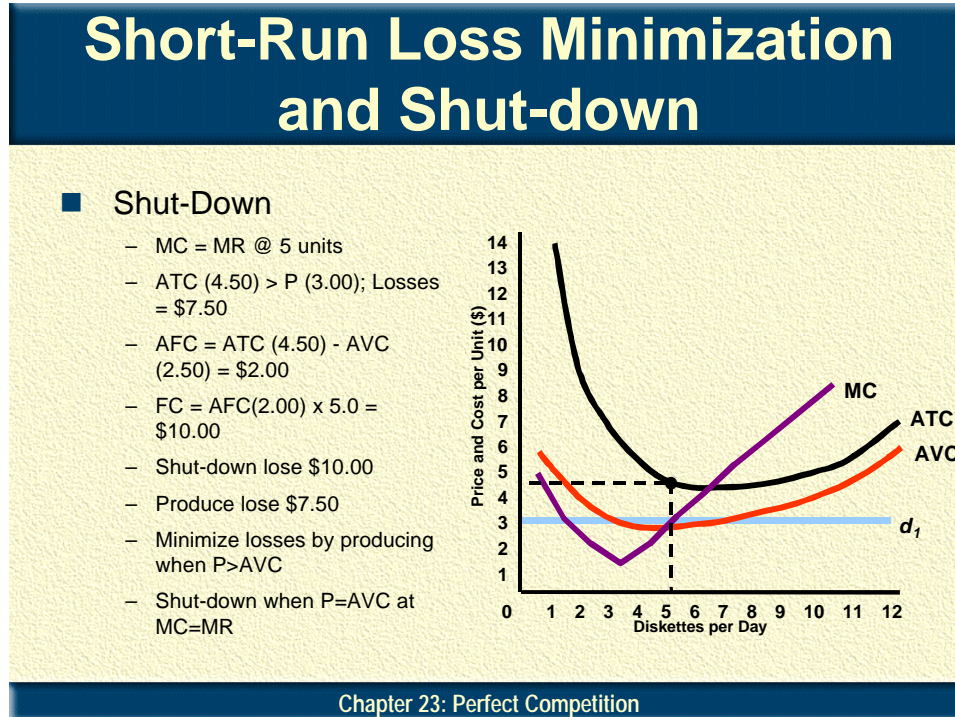
$$\text{Break-even: } P = \text{MR} = \text{MC} = \min \text{ATC}$$

And this is the point where no short-run economic profits occur and is also the long-run equilibrium for the perfectly competitive industry.





### C. Shut-Run Loss Minimization and Shutdown



The next case, short-run loss minimization is closely related to the last-case of short-run shut-down.

In the loss-minimization case,  $P = MR$  lies between the minimum of the AVC and ATC curves. As illustrated above, if  $P > AVC$  then the firm should produce in that it covers all the variable costs of production and a portion of the fixed costs. If the firm does not produce, it incurs the full amount of the fixed costs.

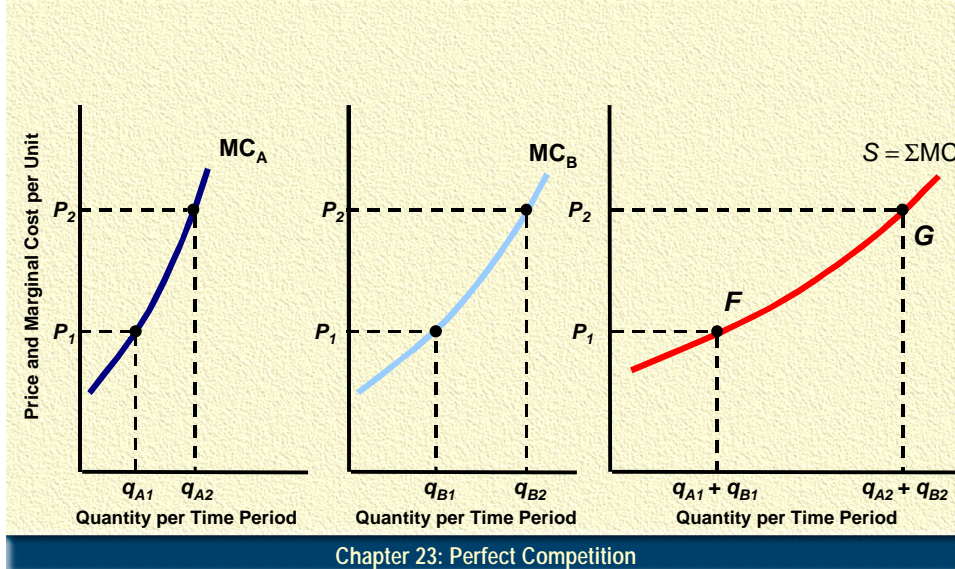
In the shut-down case, if  $P = \min AVC = MC = MR$ , or  $P < \min AVC$  then the firm should shut down since by producing it increases its losses relative to the case when it shuts down and merely incurs its fixed costs of production.

#### 5. The Firm Supply Curve and the Market Supply Curve

Note the relationship between price and the production decisions of the firm. If  $\text{Price} < \min AVC$ , then the firm will not produce. As  $P$  increases past  $\min AVC$ , the firm's output increases. Thus, the portion of the MC curve past  $\min AVC$  represents the supply curve of the individual firm.

As noted previously in Chapters 3 and 4, we can summarize the supply curves of individual firms to create the supply curve of the market. This is illustrated below.

## Deriving the Industry Supply Curve



### 6. Market Adjustment

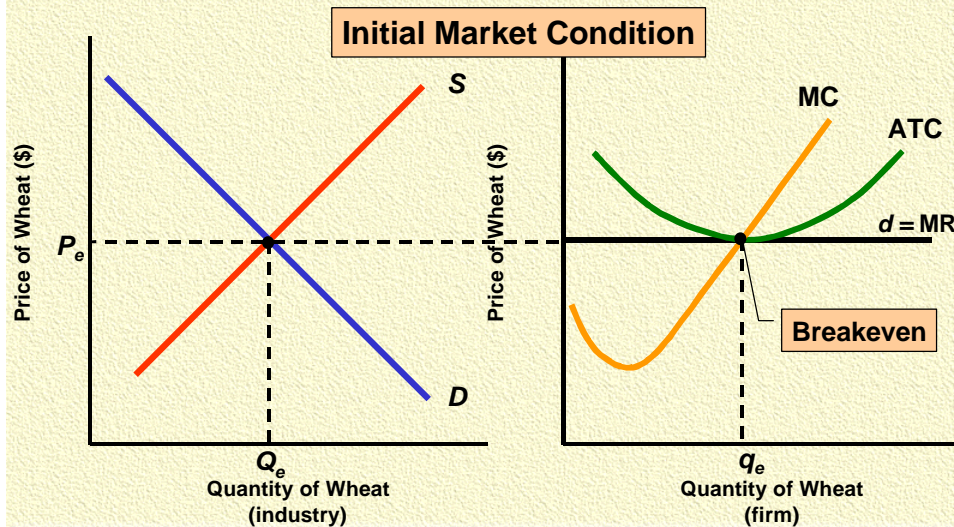
The next factor to introduce into the analysis is the prospect of market adjustment over time. Recall from our initial discussion of the perfectly competitive firm that there are no barriers to entry or exit, that is, firms may enter if economic profits are being made and depart with ease if losses are being incurred.

As illustrated below, a market in equilibrium may be disturbed by external events, resulting in an increase in demand, which results in a short-run profitability for the firms in the industry. As we will further illustrate, over time, the entrance of new firms will result in an increase in supply (or demand may decrease) such that the firms return to the long-run equilibrium.

**Graph market demand increase, decrease and adjustment**  
**Graph technical innovation affect on supply**

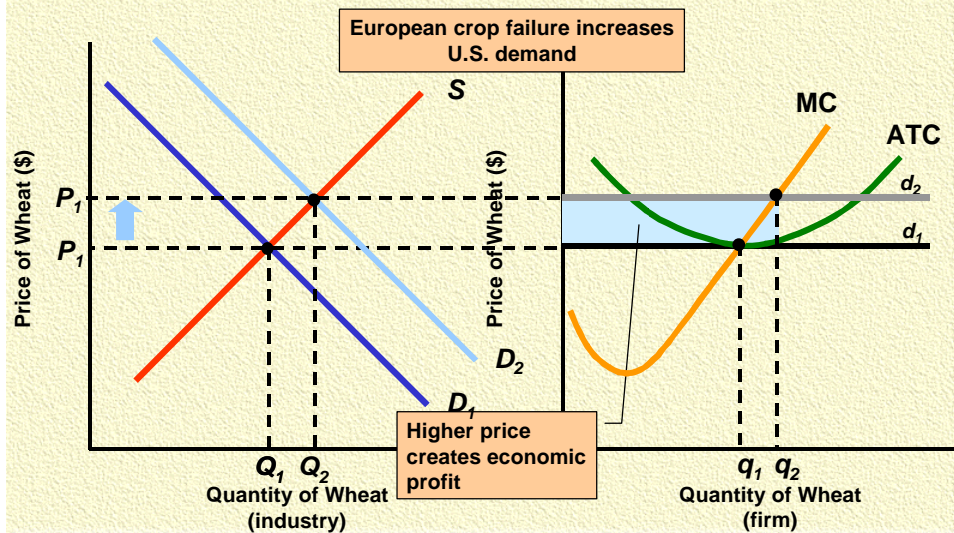


## Market Forces



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## Market Forces



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